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MICHIGAN STATE MEDICAL SOCIETY.

THE PRESIDENT'S ADDRESS,

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LAW AND INTELLIGENCE IN NATURE;

AND THE

IMPROVEMENT OF THE RACE IN ACCORDANCE WITH LAW.

BY

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ANN ARBOR, MICH.

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LAW AND INTELLIGENCE IN NATURE;
AND THE IMPROVEMENT OF THE RACE IN ACCORDANCE
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ADDRESS BY A. B. PALMER, A. M., M. D., PRESIDENT OF THE SOCIETY.

Gentlemen of the Michigan State Medical Society:

In accepting the honor which you have conferred upon me, it becomes my duty, while I esteem it a privilege, to address you; and you will allow me to thank you for your kindness, and to congratulate you upon the prosperity of the Society, and upon the character and size of the present meeting.

Your presence here—many from distant parts of our extended territory,—indicates the interest you feel in the profession you have chosen, and the love you bear to the fraternity of which you are members. And it gives me pleasure to express the conviction that your action, while at this meeting, will demonstrate not only your love for your profession and solicitude for its honor, but also your liberality of sentiments, your spirit of charity and forbearance towards each other, and to all, your freedom from narrow jealousies and petty personal ambitions; and above all, your enlightened interest in the cause of humanity, and in the discovery, establishment, and preservation of Truth.

The extraordinary attention which has been shown of late, and which must be given in the future to objects in Nature; to the qualities and laws of matter and force; to the grand structure of the natural sciences—resting, as such structure does, upon the ground of our most elementary conceptions, and extending to the sublimest conclusions respecting life, and

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mind, and Divinity itself,—gives to the medical profession an importance and a rank which it has never before possessed. The influence which this intense interest in the objects and laws of Nature is exerting and will hereafter exert upon the currents of thought and the conditions of humanity can with difficulty be appreciated, and can scarcely be over-estimated.

By this interest, and the more profound study of Nature, opinions already have been, and they are still to be, modified upon various subjects of human life and human destiny—and the world's condition in its material and social aspects is certainly being remodeled by a better knowledge of its laws. And may we not hope that ultimately, by such knowledge, it will be greatly improved?

As medical men, we have a prominent position in relation to these great movements, and an important part to perform in the world's advancement. The name Physician indicates our proper relation to the physical sciences, and intimates, as our study and experience prove, that our knowledge should embrace the general laws of matter and force; and it must be true, that in proportion to the largeness of our conceptions of Nature, and our acquaintance with her varied processes, will be our ability to understand the principles of our profession and to perform its duties.

I cannot, perhaps, better employ the hour assigned to this exercise, than to glance at a portion of the questions now occupying so much of the scientific mind of the world, and indicate some of their applications to the benevolent objects of our profession.

The grand Temple of the Sciences, at some of whose arches and stones we are thus hastily to look, may be said to rest upon the ground of Mathematics—the science of space, time, quantity, form, and numbers, and their various relations. Ideas of these are primary and necessary conceptions, without which the properties of matter and force could not be understood.

Then comes a knowledge of matter, and particularly of forces, in general—the science of Dynamics,—the laws of motion; embracing secondary dynamics, commonly called physics, molecular motion, heat, light, electricity, radiation, etc.

Next comes Chemistry—the science of the special properties of the particular kinds of matter, and the relations of one kind to another; and lastly, as the final elevation of this structure, we have Biology—the science of the properties of living beings,—and embraced in this science of life in general is our special province,—the science of Man; of his physical structure; his physiological functions, corporeal and mental; the diseases and injuries to which he is liable; the laws governing their phenomena, and the powers and influences of all the agents which may affect him in health and disease.

In looking at the arrangement of these sciences, we find that each higher in the structure depends immediately upon the one below it. Psychology, the science of thought, of sentiments, and of will,—the crowning dome of our temple, rests upon Physiology and the science of life in general; this upon Chemistry; this again upon Physics and Dynamics; and all occurring in space and time, and having relations to form, and quantity, and number, rests upon the basis of Mathematics. The appreciation of this scientific structure among men of thought in different professions is becoming too common to allow us, as men professing the highest department of science,—the science of life in man,—to remain ignorant of any of its material parts. A knowledge of all the details is impossible, but a general comprehension of the whole seems essential.

From none of the questions involved in these sciences, however startling in their apparent tendencies, must we shrink. We must even break away from the trammels of tradition, if such trammels in any way confine us, and meet fully and fairly every subject, new or old, presented to our attention. At the present day, shutting our eyes and turning our backs upon a subject does not do.

No doctrine or theory, true or false, rational or absurd, in medicine or anything else, can be pooh-poohed down. It can in no manner be silenced by standing upon dignity. We have tried this method—chiefly, it is true, from disgust—with some of the greatest absurdities the human mind has ever conceived, and these absurdities have flourished and spread—by what means I shall now refrain from declaring,—until they have invaded many of our highest circles, and taken possession, in an undefined, nebulous sort of way, of many minds. One of the most striking intellectual characteristics of the present age is the rejection of ancient authority which does not justify itself by the most frequent and open appeals to reason, and by the accumulation and presentation of the most substantial proofs. To many, the sanction of such “authority” is a signal for the rejection of almost any proposition. With such, any *new* dogma, or one rejected by those who ought to be best qualified to judge, receives the most ready and hospitable entertainment, without regard to evidence, to sense, or absurdity; and with more than the devotion and chivalry which are said to be manifested by certain Eastern tribes to those who have tasted their salt, these hosts will defend, even with their lives, their guest. And more than this, in their newly awakened zeal, they will make aggressive forays for the stranger—and for aught they know, their enemy,—which they would not make for their oldest and best tried friend.

Many of the worst vices are but exaggerated virtues, and this is but an excess of that wholesome independence which refuses to accept a doctrine simply because it is old and sanctioned by authority, and of that generous impulse which inclines to the new, though frowned on and opposed.

From this laudable independence of opinion, though often going to excess; from this impulse of advancement, though often misdirected; and from an increased knowledge of nature, though in many respects that knowledge is yet partial and imperfect, we have come to regard the problems, both of science

and of human life, from a standpoint different from our fathers. At present we are, to a large extent, on general questions, in a transitional state. Much of the old is broken up and dispersed, and much of the new is crude and unsettled—but the re-arrangement is going on.

One thing is already established in the public mind, and that is, that the results of investigation and discussion—that intellect and reason, not custom and authority, ought to rule the world. And here allow me the digression while I say that unfortunately the impression prevails among some, outside of our profession, that we are governed by prejudice and pride of opinion; that we blindly follow custom and authority; are wedded to a peculiar system, and fear the discussion of our doctrines and practice. Nothing is further from the truth than that we entertain any views or follow any practice which we fear or hesitate to discuss,—at least wherever the merits of such discussion could be appreciated. No profession is freer—none, I may safely say, is so free—from dogmas resting upon precedent and authority. We shrink from no discussion, and follow blindly no leaders. The chief object of this Society, and of all similar associations, is to promote discussion, and the discovery and confirmation of new truth.

In my judgment, we should lose no time, at whatever sacrifice of our dignity, in endeavoring to remove these false impressions. My faith is not yet quite lost in the existence and power of common sense among the people, even on the subject of medicine; and the time, it seems to me, has come, when we should patiently present data, and make appeals to that common sense in favor of truth. The men we shall have to encounter, and the treatment such efforts will receive, will doubtless render the task an unpleasant one; but it seems to me to have become a *duty*, the performance of which the interests of the community, of truth, and of our profession, alike demand. How this work is to be accomplished is a matter of deliberation. That in some way it should be done,

seems to me a necessity; and in whatever way, it should not be left for individuals to do single-handed, without sympathy and without support. There should be among us concert of action, and sustaining encouragement to those who may be willing to undertake the task. Without wishing to dictate in a matter involving so many considerations, I commend these suggestions to your attention and wisdom.

But to dismiss this digression: Nothing is now clearer to the thoughtful observer of Nature, than that, as expressed by Mr. Emerson, "The universe was made at a single cast;" that the same general laws everywhere prevail; that all existence is in the domain of law, is a part of a system, and that nothing is arbitrary and independent. This conception belongs to science, and has prevailed to some extent in all ages; but it has taken a far stronger hold upon the intellect and the imagination of those of the present, than of any previous time. "The connection of the sciences," and "the unity and universality of the laws of Nature," are expressions entering into the current speech of our day.

The discovery by Newton of the universal fact of gravitation has shown the uniformity of natural law throughout space; and the more modern discoveries of the geologists have shown the constancy of Nature's laws through time. These latter workers, by observations, and by reasonings which are irresistible, have proved that the same forces which we see around us in the air, in the water, and in the volcanic fires, have, by their slow and continued action, produced all the geological phenomena existing in the earth; and the still more modern proofs of the existence of certain forces inherent in matter—that heat and motion are mutually convertible,—and the establishment of the general doctrine of the correlation and conservation of the physical forces—the doctrine that no force in nature, any more than the substance of matter, can be either created or destroyed, but only changed in form of manifestation,—all these have taught the same great lesson of the

universality and the immutability of laws. The spectroscope has still more recently shown that the same substances exist in the sun as upon the earth, and that there, as here, their incandescence is accompanied by the same phenomena of light.

The universality of law is also apparent, though not so readily demonstrable, in the science of life; but this obscurity is because the subject matter is more complex, and the details are not as perfectly understood. Most of the problems in the much talked of subject of the "origin of species" seem to be in the way of being solved by a knowledge of the laws of variation, development, habit, hereditary influence, and adaptation. But however the solution may be, the origin of specific and individual life is now recognized as a problem to be determined by observation of facts, and reasoning upon laws, precisely in the same manner as has been studied the origin of the solar system, and the questions in geology. These are all questions of origin; of cause and effect; of the operations of law in space and time; and this genetic method of research has made science historical. A similar systematic method applied to history makes it scientific. The conviction is becoming general that we cannot fully understand anything unless we know its origin; and the scientific mind no longer rests in the observation of isolated facts, or is satisfied by simply referring the existence of each form of matter or of life to an inscrutable First Cause. The relations of each object to the rest of the universe, the laws of its existence and the method of its origin—the *how*, if not the *wherefore*, is sought for with an eagerness characteristic of our intellectual activity, and with a success in many cases which startles, if it does not always satisfy us.

Of late the scientific and even popular mind has been especially directed to the problems of vitality. Such questions as the essential nature of the vital force, its co-relation with other forces, the properties of protoplasm, and the fact and the method of its development into different forms of living

beings—all these are elaborately discussed in our standard and periodical literature, and furnish the staple of conversation in many a social circle.

In a single discourse it cannot be expected that the many conclusions upon these subjects which have been rendered probable, or even those which have been arrived at, can be fully stated, and much less that the facts upon which they are based and the arguments by which they are supported can be presented. Some of the more suggestive considerations, and those more allied to our studies and objects, I will endeavor to sketch as they may present themselves, without so carefully following a logical order.

With regard to the production of life and the origin of species, I think it may be said that the most careful and conscientious researches seem to be carrying a large majority of scientific minds to the conclusion, that natural laws still in operation, acting in matter in its nascent and susceptible condition, have, at a remote period during the long ages of the past, resulted in the production of living organisms; and that the developmental forces inherent in organic matter, through natural selection, adaptation, heredity, and the survival of the fittest—*all these laws and forces established, supplemented, subordinated and guided by a supreme intelligence*, have gradually brought into being the present world of life, with all its specific differences and individual peculiarities. In this plan of development man seems to be included. I hope no one who hears me will be shocked at this statement, for if this doctrine be proved true, though it is not as yet, conclusively, no one's faith either in the general providence of God, in the existence of the soul, or in the immortality brought to light in the Gospel, need be disturbed.

Much of the conflict so long waged between science and religion has arisen from a misunderstanding of the demands of each. Some have supposed by *creation*—as of species, for instance—was necessarily meant primary or *absolute* creation;

the production of something out of nothing, or, at least, that a process was implied indicating supernatural action. Not conceiving of *derivative* creation—which is a new arrangement of existing materials under intelligence and law, as we speak of making a knife or creating wealth—they have opposed the doctrine of creation altogether, regarding it as absolute, in the imagined interests of physical science.

Others, supposing that by “evolution” was necessarily meant a denial of Divine action and the rejection of the doctrine of Divine Providence, have therefore combated the theory of development, natural selection, etc., in the imagined interests of religion.

There is nothing in the evolution theory, as I understand it, even if there be included in it the change of non-living matters into living without the intervention of parents, which in any way excludes Divine action or the doctrines of Providence, general or special. It may be regarded as merely a question of the manner of Divine action, and he who contends that living beings must be produced in any particular way or ways, imposes more limits upon the Omnipotent—does more to deny what we believe of His power than he who in humility and sincerity inquires for the facts and is ready cheerfully to accept whatever is proved. This is not only the scientific, but it is equally the reverential and religious spirit. It is the spirit of faith as well as of truth. It manifests confidence in the religious principles in which one stands. This is not only in accordance with reason, but with ecclesiastical authority.

St. Augustine, whose authority in the earlier Christian ages stands above that of any other writer, contends in very explicit terms for the merely derivative sense in which God's creation of organic forms is to be understood—that they were created by His having conferred upon the material world the power to evolve them under suitable conditions. And St. Thomas Aquinas, whose authority in the church in the Middle Ages

all students of ecclesiastical history know, quotes with approval the saying of St. Augustine, that in the first institution of nature we do not look for miracles, but for the laws of nature; and he further quotes with approval St. Augustine's assertion that the kinds were created only derivatively, "*potentialiter tantum*." This doctrine of derivative creation, so explicitly taught by the fathers of the church and by many of the highest modern theological authorities, Dr. Tayler Lewis, for instance, is certainly intimated, if not directly taught, in the Mosaic account; and it would have met with less opposition had not Milton's poetic fancy instilled into the popular mind, as Bible truths, various notions which the language of the Scripture does not sustain. And, let me add, this doctrine of derivative creation harmonizes with all that modern science can possibly require. It was truly said by Roger Bacon: "The saints never condemned many an opinion which the moderns think ought to be condemned."

The doctrine of spontaneous generation, as it is called, as taught by Bastian and accepted by Owen, and apparently implied in Genesis by the expression, "Let the earth bring forth the living creature after his kind," "Let the waters bring forth abundantly the moving creature that hath life," is in no degree opposed to the most orthodox theology. There is, indeed, a general agreement of theological authority, if such authority be regarded as of weight, that the supernatural is not to be looked for in the sphere of mere nature.

After the establishment of living forms, the subsequent development and progress of organic life occur in accordance with laws and by the operation of natural forces,—laws, some of which we are able to trace, and forces, many of which we are able to recognize. But this does not exclude that higher agency concerned in the establishment of the laws and in the existence of the forces. Results follow from the operation of law in the organic as in the inorganic world; and that the machinery of the universe is so complete that it is able to do

its work without special interference, proves its perfection and the wisdom of its Author. It is scarcely too much to say that the more fully the conception of universal evolution and the government of law is grasped, the more firmly a scientific doctrine of Providence will be established, and the stronger will be the presumption of a future life, of future development, and future progress.

But are not human beings exceptions to this general law of development? Not if it be a general law. So far as our organisms are concerned, all analogy and reason indicate that we come under the same laws as the rest of the animal creation, and the theory of our development from lower forms has no insurmountable difficulties, even of an orthodox theological character. But are we, then, the descendants of monkeys? The doctrine of evolution by no means implies this. The organic series is not represented by a chain, or by an intertwining piece of net-work, but by a tree, the primary stem dividing into the animal and vegetable kingdoms, and each of these into numerous other divisions, ascending and spreading to the topmost branches, each branch being independent of the rest but all having their roots in the same mother earth. If the development of man has been gradual, it has not been through existing forms. We find each individual man the product of an evolution as mysterious, and as humiliating, for that matter, as that which is supposed by the development of the race. His organic structure arises from an ovum not to be distinguished from that of the brute, and by a process which, in all essential respects, is the same. Yet, one is a man and the other a brute. Whatever the origin of the race we find it human, with all the attributes of humanity. And whether it was suddenly produced in its present form by a miraculous act, or gradually, through countless lower organisms by the action of natural laws, it matters not; but when the physical structure was brought to the requisite degree of perfection, we are informed that the Creator "breathed into him the breath of life and he became a living soul." The

spiritual character followed the corporeal structure, just as the individual infant at some certain *stage* of its material development becomes, as we believe, a spiritual and an immortal being. The cases are perfectly parallel in their nature and their mystery.

I wish, however, distinctly to be understood as not giving my assent to the whole Darwinian doctrine. Darwin and Spencer believe, or at least teach, that the laws of hereditary influence and variation are sufficient to account for the whole of the modifications by which the most highly organized vegetables and animals have been derived by descent from their first vitalized but unorganized germs. But it seems to me, and to many who accept, as I do, provisionally at least, the general doctrine of evolution, that the conviction cannot be resisted that there is an *Intelligent Power* acting through and controlling the laws of habit and variation, just as the vital forces act through and control the inorganic ones. The laws of physics and chemistry are not suspended in living organisms, but modified and more or less controlled by the vital force; and so the laws of natural selection and adaptation, of habit and variation, are by no means suspended by the principle of intelligence which pervades nature, but are supplemented by that principle, and are, in many respects, under its control. There seems, indeed, everywhere the evidence of intelligence in the operations of nature, in the organization and the instincts of plants and animals, as well as in the higher functions of man. This seems to me too evident to admit of rational doubt. But whether exercised consciously by a personal being, or existing as an unconscious element in the very constitution of things, is not so certainly determined by the dim light of nature alone. At least, among thinkers, there have, upon this point, been differences of opinion expressed. But it would seem that an intelligence that knows anything would know its own existence; and I can see nothing, unless it be a perverse human heart, that contradicts the

conception that this intelligence is exercised by a conscious being, by an omnipotent Father. Causation is universal, and is the means by which all things are produced; but organic adaptation implies intelligence which directs the operation of physical causes.

While there are many things in the organic world that may be accounted for on purely physical principles, there are others which require the supplementary power. For instance, before the first mammal was born, in the process of development and of nature, there must have been a mammary gland in the parent, provided for its sustenance; otherwise the young animal would have perished. But we fail to see how there could have been any process of use or habit by which such gland could have been developed, and it must have been provided for by an intelligent power,—a power establishing and guiding physical law. So of many things which we see around us. We cannot understand how an eye, or an ear, with its wonderful adaptations, could be produced by mere physical or natural laws, without an intelligent power guiding those laws. But still, the physical laws are in operation, producing all the results of which they are capable. The higher, however, in the scale of nature we ascend, the less clearly do we see physical cause and effect, and the more clearly do we discern the apparent relation of means to purpose, just as in the higher forms of organic structures the more decidedly do the life forces supplement and control the merely chemical and physical forces, which are, nevertheless, still in operation within such structures.

All things are within the realm of causation and of law, and at the same time nothing is without the sphere of the All-pervading Intelligence. We conclude, therefore, that science itself declares a Supreme Power in matter and in force, working always, however, in accordance with laws. The personality and the special attributes of that intelligence are subjects of revelation rather than of positive scientific deduction. Had the light

of nature been sufficient to teach us all we have need to know of the Supreme Being and our relations to Him, no revelation would have been necessary and none would have been given. But such revelation was necessary to supplement the light within us, which, in view of what is required, is but darkness.

I hope it will be understood that in giving prominence to laws and their results, I always mean laws established by the Supreme Intelligence of the Universe, and supplemented by His wisdom and subordinated by His power.

To illustrate this subject of the universality of laws and the connections and analogies which may be traced—a subject with which none of us can be too familiar,—allow me to indulge in a few farther statements in regard to some of the natural laws.

We observe in nature three kinds of *formative process*, unlike each other in results. We have, *First*: Simple Attraction—The attractive force acting alike in all directions and causing spheres, as in a rain-drop. *Second*: Polarity—Attraction acting more in some directions than in others, producing crystals, and, *Third*: The organizing, vital process, much more complex in its operations, and producing living beings. In simple attraction, forming spheres, though the gravitating force is a mystery, taking it as a datum, the result is understood. We see how the sphere is produced. We may in time learn the laws of attractive polarity so as to explain the formation of crystals, though we cannot do so yet. But the matter is so complex that we may never be able to explain, on physical and mathematical principles, the manner in which an organism of a highly complex character is produced from a structureless and homogeneous germ. The sphere is the result, not the cause of the attraction, and so with the crystal. The crystalline polarity—this peculiar form of attraction produces the crystals; not the crystals the polarity. In like manner organic forms and structures are the result of the organic formative principle. Life in matter, we see more clearly from

these analogies, must be the cause of organization, and not organization the cause of life. The arranging, formative principle must precede the arrangement—the formation. The organization must be produced by the organizing force, and it would seem, from the many curious results observed, that this organizing force must have been the product of an intelligence still back of all these forces and results. “Organization in action,” one of our definitions of life, seems not to be the true one. It is expressive of certain phenomena occurring in living beings, but fails to define life itself. The essential quality of living beings or living matter consists in certain relations of matter and energy. The exact character in all respects of these relations we do not know, but we see and may study their results. That heat and electricity have certain relations to vital actions is apparent, but the precise relations are not yet determined. There is evidently transformation of energy in life processes—energy transferred from food and heat, etc., to the organism,—but we cannot see precisely what. It appears, however, to be clear that the life principle is essential to and must precede all organic movement. Food, the pabulum of organized bodies, must be vitalized before it can be organized—it must be endowed with a peculiar energy before its particles can move into their proper places, and before there is a complete transformation of energy. There was an ancient notion that within the first parent of each species, was infolded in miniature all the forms of the future generations. Modern science has, however, discovered that germs are without structure or definite forms. Structure and organization, the arrangement of formless particles into regular or differentiated structures, and the building up of organs for the performance of functions, are acquired with growth. Some living masses (*amæba*) remain structureless and without definite or constant forms; but they move and appropriate nourishment, and thus have life functions. Formless germinal matter is peculiarly living, has plastic or formative power,

and, consequently, life in a high degree. A salt in solution has a crystalline force, a tendency to form crystals, and each salt its own particular kind; and so analogously with the germinal matter of organisms. There is an organizing force, or a tendency to assume specific characters "after its kind."

Crystals, again, repair their own injuries, and organisms do the same. Separate parts of many vegetables and some animals become complete individuals, and the repair principle—the disposition to return to definite and typical forms and actions—in other words, the *vis medicatrix naturæ*, belongs, in a greater or less degree, to all. From these and other resemblances, we find that up to a certain point organic and inorganic—living and dead—matter have properties and forces much alike. The lower forms of organisms approach the inorganic masses much as the lower forms of vegetables and animals become undistinguishable from each other; but as we ascend in the scale, we see the more marked divergences in structure and action. A crystal, as well as other forms of inorganic matter, is nearly alike in every part; an organism differs in different parts, but its most characteristic quality is the adaptation of structure to function—of means to purpose,—of organs for the performance of actions in accordance with the laws of its being.

As we come into these higher realms in the ascending scale, more complex structures and processes and a higher intelligence appear, but throughout nature the same general principles exist, the one system of laws prevails, and, allow me to repeat, the one intelligent and Supreme Power is over all.

This hasty and very imperfect view of some of the general scientific principles of nature, of the union of matter, of force and of intelligence, acting under general laws, seems necessary as preparing the way for a few and more practical remarks, which you will indulge me in making, upon one of the most important principles in living nature, viz: *Habit*, its laws, its influence in the production and perpet-

uation of specific qualities, and its relations to the improvement or deterioration of human beings and human society. I shall use the word habit in the sense of a *quality given to an organism by use*, extending it to structural and functional properties, to unconscious as well as conscious acts, to vegetables as well as animals, and to species as well as individuals. All vital functions tend to become habitual; not only those which are active, but those, also, like sensation, which are spoken of as passive.

The primary law of habit is, that all vital actions tend to repeat themselves, or become easier of performance when repeated; and this not only in the individuals in which the habit is formed, but also in the offspring and the race. Habits, then, in their tendency to be transmitted, include the principle of *heredity*, and *heredity is a part of the law of reproduction*. To define *habit*, we may say it is a tendency to certain conditions and actions—formative, motor, and mental,—given by use, and which may be transmitted to offspring.

This principle of habit, thus defined, is an exceedingly important agent in the origin and development of species, and in giving characteristics to the organic and intellectual world. How a tendency to certain conditions and acts is transmitted from parent to offspring, is at present a mystery—but no more so than other facts of reproduction, and no less so than the origin of species and of life itself,—but it occurs, like everything else in Nature, in accordance with law. As already stated, all living beings, as a part of their nature, have the power of transforming matter and energy from their surroundings into their own organisms, each in its own particular way. The laws pertaining to this power, and those belonging to habit, are at once elementary and universal, and are as ultimate and unaccountable as the laws of gravity and chemical affinity. We have only to accept them as facts, and to study their characters.

While the primary law of habit is a tendency to the repeti-

tion of previous acts and an increased facility in performing them, there are various subordinate laws well worthy of attention, and their results are manifest throughout the world of life.

A careful analysis of any of the instincts of vegetables, animals, or men, will show them to be little—perhaps nothing—else than *hereditary habits*. Familiar instances of transmitted habits are observed in the offspring of dogs which have been trained to the performance of particular acts, such as “pointing” in hunting birds, as herding cattle or sheep, or sallying forth from the convent of St. Bernard, to seek for snow-engulfed travelers in the mountain passes. It is well known that the young animals of such parents will take to the same practices at an early age almost spontaneously, or with very little instruction.

The more natural instincts are of slower growth. They are developed under the influence of organic promptings and of external surroundings, and are deepened and intensified by transmission through many generations.

The young partridge or squirrel, when approached by man or any of its natural enemies that prey upon it, struggles to escape with all the instinctive fear which the accumulated experience of generations of its kind has impressed upon its very nature. We speak of the animal as a wild one, but may not have reflected how it became wild. Birds in New Zealand, where their race has not been preyed upon by man, are without fear of his presence,—will alight upon his person, and pick at his flesh, with more than the tameness of domestic fowls.

Habits which have grown up and been exercised through many generations are remarkably tenacious, are but slowly obliterated by disuse, and often, when apparently lost, are only latent, reappearing in force when circumstances occur to bring them into action.

A few months since I was driving a horse I had often driven there before, across a common, which had been

occupied some days previously by a traveling menagerie. The debris had been removed, and there was nothing unusual to strike the eye. On coming to the spot where the tiger's cage had stood, my horse, by no means a timid one, discovered an odor perceptible to her acute senses, became furiously alarmed, and dashed off with a speed that was with difficulty controlled. The explanation of this probably was, that generations back, the remote ancestors of my horse, in their native state, occupied the same regions with beasts of this kind, which preyed upon them. The experience of untold generations had impressed upon that variety of horses the self-preserved fact that the lairs of such animals were the places to flee from; and the old instinct—unexercised for, I know not how long,—was instantly brought into the most furious action. The young chicken, away from its mother hen, flees in the utmost terror the first time it hears the cry of the hawk, the enemy of its race. The bird builds its nest, the beaver its dam, and the bee its cell, in the same fixed way, through an impulse, originated and guided by a spirit of intelligence, but transmitted as habit through unnumbered generations. Examples of these instincts are too familiar to be further cited. They are all perpetuated under the same general laws, and are all explicable on the same principles.

When a peculiar tendency is inherited, it often appears in the offspring at a similar age at which it was manifested in the parent; but sometimes earlier, and very rarely if ever later. Hereditary diseases, with which we unfortunately are too familiar, afford illustrations of this statement. The consumptive child of a consumptive parent frequently has the disease about the period of life the parent was affected, though sometimes earlier; and in another constitutional and hereditary affection, it is well known that "the sins of the fathers are visited upon the children," even before they are born.

In the important fact that new habits may be formed, we find evidence of the law that they are *changeable*. They are

constantly produced by a voluntary course of actions, by change of circumstances, and by education, physical, intellectual, and moral, which is only a special and particularly arranged set of circumstances.

But in habits there is also a certain amount of *spontaneous variability*, not perceptibly dependent upon changes of circumstances. No two children of the same parents are exactly alike, and some are quite different, though the products of the same birth; and these more fortuitous changes, acting cumulatively through many generations, produce at length very wide differences. There are, indeed, *habits* of varying in particular directions, becoming characteristic of individuals and species.

Again, the acquisition of any power that depends upon habit, makes it easier to acquire other powers of a similar kind; and habits are weakened and may be destroyed by firm resistance and continued disuse. They are thus largely under the control of the will; and therefore, for the existence and continuance of many of them we are responsible.

The strength of a habit depends very much upon the time it has continued in exercise, and the period since which it was indulged. Its *present* strength depends more upon its recent exercise; its *tenacity*, upon the length of time it has been in action. If a hereditary habit be strengthened by much individual exercise, it becomes doubly strong—often imperative and tenacious,—especially where its indulgence is accompanied with decided effects, of whatever character, on the organic system. Illustrations of this may be observed in the habitual and hereditary use of alcohol, opium, and other narcotics.

Another law is, that active habits are strengthened, while passive impressions may be weakened by repetitions. An accustomed sound, passively heard, will at length fail to make an impression, while if actively and habitually listened for, and its peculiarities noticed, its impressions become more vivid and precise.

It is well known that the size of organs is increased by exercise, and diminished by disuse, and the functional powers of such organs, by such exercise, are more than correspondingly varied. While great and sudden changes, as of climate, food, occupation, etc., are injurious, and may be destructive, more moderate variations of these conditions are often beneficial. The breaking in upon monotony, and the exercise of adaptation, often develop new and improved qualities; as the mingling of races, if their characteristics are not too much in contrast, frequently results in varieties materially improved.

These are some of the laws which pertain to habit; and it will readily be seen that the influence of this principle in moulding character and determining happiness or misery, is almost without limits. Whatever may be thought of the sufficiency of natural causes; of the relations of matter and force; of the influence of habit and adaptation, and of natural selection, etc., to develop life and originate species, there can be no doubt whatever of the immense influence these causes exert upon the whole organic kingdom; and that in reference to man and all his characteristics, structural, motor, sensitive, intellectual, and moral, the laws pertaining to his physical conditions must be understood, and their demands complied with, in order to his fullest advancement, and his highest perfectibility in any department of his nature.

The views I most wish to impress, drawn from all that has preceded in this discourse, are, that in Nature, in connection with a Divine Intelligence, there is a universal "Reign of law;" that natural causes, physical forces, material agencies, modifying circumstances, and especially the power of habit, acting together with mental and spiritual forces, determine the character of human beings and human society,—and as a corollary to these conclusions, comes a conviction of the vast improvement which may be effected in man and society, by obedience to all beneficent laws, and the wise use of proper means.

Whatever may be our views respecting the soul and its destiny; whether this world be regarded as the place of our utmost culmination, or only a preparatory entrance to another, the great importance of the present life must be conceded. If it were the all of our existence, we should certainly make the best and the most of it. Or if, as we believe, it is the theater of preparation for another state of being, the best and, may I not say, the only way to provide for that future is to obtain, by the natural and the gracious aids provided, the greatest advancement and the highest perfection in the present. While consoling ourselves with what we hope for, we should use our greatest diligence for improving what we already have. Whatever view, then, we take of the future, our most immediate and, indeed, our greatest concern is with the present life. And in this world, at least, the intellectual and the spiritual must have a foundation in the physical and the material. Notwithstanding that in individual and exceptional cases we may see high mental and spiritual qualities in feeble organizations, they are specimens of unsymmetrical and abnormal development and excitement, and in the long run, and especially in the succeeding generations, the laws of nature will assert themselves, and feebleness and degeneracy, intellectual and moral, as well as physical, will be the result. The offspring of pallid "lightning calculators," and other intellectual prodigies, are likely to be dunces; and the children of etherialized, ecstatic invalids are very likely to be morally depraved. This is no contradiction to the law of heredity. The general condition of feebleness, of want of balance, and of physical depravity, are transmitted; but very seldom is the peculiar and transient quality—never, perhaps, in its full force, and hence general degeneracy will follow.

Any improvement in the condition of man, to be enduring, must embrace his whole being—physical, mental, and moral; and if the physical, which is the foundation, be defective, the whole superstructure, sooner or later, must totter and fall.

"First, that which is natural; and, afterwards, that which is spiritual," applies not only to the order in which the human being was developed, but also to the manner in which the race must be sustained.

But our profession has principally to do with the evils, and especially with the physical evils, of this present life. However favorably we may be disposed to regard the present state, we certainly have too many sad experiences to be unmindful of the fact that we are in a world abounding in unrest, in disease, and in sufferings of various kinds; and though the lower animals are more or less subject to accidents and pain, the chief burden of distress falls upon our race.

The higher the organization, the more distinct its various parts, the more precise their functions, and the more complex the mechanism and the combinations of actions, the more difficulty will there be in adaptation to some unfavorable circumstances, and certainly the greater will be the liability to derangement of function and structure, constituting disease. Although the whole organic kingdom is under the same general laws, yet there are circumstances belonging to man in civilized society which, to some extent, modify these laws and render his relations to them peculiar. In the operation of the laws of natural selection, and in the struggle for existence among the lower animals in a state of nature, the "survival of the fittest" is the result. The animal that is swiftest and strongest seizes its prey and lives. The one that is slowest and feeblest fails in the chase and dies. In changes to a more rigorous climate, the animal most hardy and best clothed with fur or down, survives; the one in opposite conditions perishes. Those having most prowess in the battles so often waged, propagate their kind; while those least courageous and powerful have none succeeding them to perpetuate their qualities. Among animals, and to a large extent among savage men, the feeble, the wounded, the sick, and the decrepid are unprovided for, and left without care to perish.

inheritance of evil to remove, and that it is criminal to entail any evils upon posterity which care and self-restraint can avoid.

Allow me, in conclusion, gentlemen, to congratulate you upon the success which has attended the efforts of this Society in the inauguration of measures looking to the prevention of disease. By the recommendation of this Society some years ago, a foundation for sanitary knowledge was laid in the enactment of a statute for the registration of births, marriages, and deaths. One of our number, with a zeal and success worthy of all commendation, has elaborated the statistics furnished under the law, and presented reports which are highly creditable to himself and to the State.

By the urgent request of the Society, expressed in resolutions and by a committee to visit our late and present Governors and call their attention to the subject of a State Board of Health, these enlightened gentlemen, keenly alive to the interests of the people, and already impressed with the importance of the matter, recommended, in their messages to the Legislature, the establishment of such a board, and that body, to whom for this our thanks are due, have responded to those recommendations in the enactment of a law entirely in accordance with the advancing spirit of the times. Under this law a board has been appointed chiefly from the members of this Society, with our able former President at its head, composed of gentlemen fully competent to perform the duties before them, and from whom much is expected by the profession and the people. I cannot doubt that this Society will ever be ready to sustain them in the great work they have undertaken.

The medical profession of the future, should our hopes of human progress be realized, will be diminished in numbers, but elevated in character, and their functions will in some degree be modified. They will be less occupied with the phenomena of diseases, and more with their causes—less in curing, but more in preventing,—less occupied in attending upon the

sick, and more in giving advice to the well. These higher, and at present more disinterested functions, we should ever be ready to perform in the interests of humanity. They are now more particularly assumed by the State Board of Health. This body, in a large measure our own creation, in order to its greatest efficiency, must be actively aided by information from the profession in different localities, and by contributions from those whose peculiar studies and experience may render them familiar with particular departments of knowledge bearing on sanitary science. It is hoped by their suggestions and labors, that the registration of births, marriages, and deaths will be made more perfect, and the facts more fully utilized; and that some plan will be devised for obtaining statistics approximating correctness, of the amount and character of the *sickness* prevailing in different localities, as well as of the deaths; and particularly should a knowledge of the *causes* be obtained and recorded, of such occurrences, designating such as are avoidable, with the specific means of prevention to be applied. The field is certainly broad, is waiting for the laborers, and it is hoped the harvest of good will be abundant.

The entering upon this work is a practical recognition of the views which constitute the leading feature of this discourse. In it I have endeavored to point out the uniformity and the universality of law in the government of the world; that evil is to be overcome, and good promoted, in accordance with the laws pertaining to the physical, the intellectual, and the moral nature; that human nature and social life are capable of vast improvements by taking advantage of natural laws and intelligently guiding their operations; and that although the work may be slow in accomplishment, yet, with time, patience, and proper exertion, every evil not essential to a finite existence may be eliminated, and that the yawning gulf between the actual and the ideal of our earthly condition may be bridged over; and finally, that in this beneficent work our noble profession must bear a conspicuous part.

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